

CLAIMS

WHAT IS CLAIMED IS:

- 1 1. A method of aligning a first waveguide and a second waveguide, the first and
2 second waveguides each having a core, the first and second waveguides comprised of
3 dissimilar materials, the method comprising:
4 applying a first alignment dot to an end surface of the core of the first
5 waveguide;
6 applying a second alignment dot to an end surface of the core of the second
7 waveguide;
8 positioning the first alignment dot in proximity to the second alignment dot;
9 and
10 melting the first and second alignment dots together.
- 1 2. The method of claim 1, wherein the first waveguide is an optical fiber.
- 1 3. The method of claim 1, wherein the second waveguide is a planar waveguide.
- 1 4. The method of claim 1, wherein applying the first alignment dot to an end
2 surface of the core of the first waveguide further comprises:
3 applying a photo sensitive optical material to an end surface of the first
4 waveguide;

5 exposing the photo sensitive optical material to a light beam traveling
6 through the core of the first waveguide, the light beam having a
7 wavelength that cures the photo sensitive optical material to create a
8 first portion of the photo sensitive optical material that is cured and a
9 second portion of the photo sensitive optical material that is not cured;
10 removing the second portion of the photo sensitive optical material that is
11 not cured.

1 5. The method of claim 4, wherein removing the second portion of the photo
2 sensitive optical material that is not cured further comprises:
3 using a solvent to remove the second portion of the photo sensitive optical
4 material that is not cured.

1 6. The method of claim 4, wherein removing the second portion of the photo
2 sensitive optical material that is not cured further comprises:
3 using an etch to remove the second portion of the photo sensitive optical
4 material that is not cured.

1 7. The method of claim 1, wherein applying the first alignment dot to an end
2 surface of the core of the first waveguide further comprises:
3 applying a mask to an end surface of the first waveguide;
4 ablating a portion of the mask by exposing the mask to a high energy light
5 beam traveling through the core of the first waveguide to create a mask
6 opening; and

7 filling the mask opening with an optical material to form the first alignment
8 dot.

1 8. The method of claim 7 further comprising:
2 removing the mask from the end surface of the first waveguide.

1 9. The method of claim 1, wherein the first alignment dot comprises a polymer, a
2 sol-gel, or a glass.

1 10. The method of claim 1 further comprising:
2 using alignment dots to align an array of optical waveguides.

1 11. A method of aligning an optical fiber to a planar waveguide, the optical fiber
2 and the planar waveguide each having a core, the method comprising:
3 applying a first alignment dot to an end surface of the core of the optical
4 fiber;
5 applying a second alignment dot to an end surface of the core of the planar
6 waveguide;
7 coupling the first alignment dot to the second alignment dot; and
8 melting the first and second alignment dots together.

1 12. The method of claim 11 further comprising:
2 allowing the optical fiber or the planar waveguide to move while melting the
3 first and second alignment dots together.

1 13. The method of claim 12 further comprising:
2 applying an additional bonding agent between or around the optical fiber and
3 the planar waveguide.

1 14. The method of claim 11, wherein the first alignment dot comprises a polymer,
2 a sol-gel, or a glass.

1 15. The method of claim 11, wherein the second alignment dot comprises a
2 polymer, a sol-gel, or a glass.

1 16. A method of aligning a first waveguide and a second waveguide, the first
2 waveguide having a core, the core of the first waveguide having a first alignment dot
3 attached to it, the second waveguides having a core, the core of the second waveguide
4 having a second alignment dot attached to it, the first and second waveguides having
5 different cross-sectional shapes, the method comprising:
6 positioning the first alignment dot in proximity to the second alignment dot;
7 and
8 melting the first and second alignment dots together.

1 17. The method of claim 16 further comprising:
2 allowing the first waveguide or the second waveguide to move while melting
3 the first and second alignment dots together.

- 1 18. The method of claim 17 further comprising:
2 applying a bonding agent over the first and second alignment dots to better
3 adhere the first and second waveguides together.
- 1 19. The method of claim 17 further comprising:
2 applying a curable polymer over the first and second alignment dots to better
3 adhere the first and second waveguides together.
- 1 20. The method of claim 17 further comprising:
2 using alignment dots to align multiple waveguides at substantially the same
3 time.
- 1 21. The method of claim 20 further comprising:
2 using the alignment dots to align a fiber ribbon.
- 1 22. A method of forming a self-aligning alignment dot on an end surface of a
2 waveguide, the method comprising:
3 applying a mask to an end surface of the waveguide;
4 ablating a portion of the mask by exposing the mask to a high energy light
5 beam traveling through the waveguide to create a mask opening; and
6 filling the mask opening with an optical material.
- 1 23. The method of claim 22 further comprising:
2 removing the mask from the end surface of the waveguide.

1 24. The method of claim 22, wherein ablating a portion of the mask further
2 comprises:
3 ablating the portion of the mask with an ablating light.

1 25. The method of claim 24 further comprising:
2 coupling an optical probe to the waveguide to provide the ablating light.

1 26. The method of claim 25 further comprising:
2 positioning the optical probe in a probe region above the waveguide, the
3 probe region having a waveguide upper cladding that has been at least
4 partially removed.

1 27. The method of claim 25 further comprising:
2 positioning the optical probe in a probe region above the waveguide, the
3 probe region having an upper cladding of approximately 0-3 microns.

1 28. The method of claim 25, wherein the ablating light is an UV light.

1 29. The method of claim 22, wherein the waveguide is an optical fiber.

1 30. The method of claim 29 further comprising:
2 aligning a far end of the optical fiber to a light source;

3 forming the self-aligning alignment dot on an opposite end of the optical
4 fiber;
5 cutting off a segment of optical fiber with the self-aligning alignment dot;
6 and
7 forming another self-aligning alignment dot on the opposite end of the
8 optical fiber without re-aligning the far end of the optical fiber.

1 31. The method of claim 22, wherein the waveguide is a planar waveguide.

1 32. The method of claim 22, wherein the optical material comprises a polymer or
2 a sol-gel.

1 33. A method of forming a self-aligning alignment dot on an end surface of a
2 waveguide, the method comprising:
3 applying a photo sensitive optical material to an end surface of the
4 waveguide;
5 exposing the photo sensitive optical material to a light beam traveling
6 through the waveguide, the light beam having a wavelength that cures
7 the photo sensitive optical material to create a cured portion of the
8 photo sensitive optical material and an uncured portion of the photo
9 sensitive optical material; and
10 removing the uncured portion of the photo sensitive optical material.

1 34. The method of claim 33, wherein removing the uncured portion of the photo
2 sensitive optical material further comprises:
3 using a solvent to remove the uncured portion of the photo sensitive optical
4 material.

1 35. The method of claim 34, wherein removing the uncured portion of the photo
2 sensitive optical material further comprises:
3 using an etch to remove the uncured portion of the photo sensitive optical
4 material.

1 36. The method of claim 33 further comprising:
2 coupling an optical probe to the waveguide to provide the light beam
3 traveling through the waveguide.

1 37. The method of claim 33, wherein the waveguide is an optical fiber.

1 38. The method of claim 37 further comprising:
2 aligning a far end of the optical fiber to a light source;
3 forming the self-aligning alignment dot on an opposite end of the optical
4 fiber;
5 cutting off a segment of optical fiber with the self-aligning alignment dot;
6 and
7 forming another self-aligning alignment dot on the opposite end of the
8 optical fiber without re-aligning the far end of the optical fiber.

1 39. The method of claim 37, wherein the waveguide is a planar waveguide.

1 40. The method of claim 33, wherein the photo sensitive optical material
2 comprises a polymer or a sol-gel.